4. SYLLABUS



4.1 INTRODUCTION

The undergraduate students of the Department of Civil Engineering have to follow the course schedule given below. The letter prefix in any course number indicates the department offering the course viz. CE for Civil Engineering, EEE for Electrical and Electronic Engineering, Chem for Chemistry, Phy for Physics, Math for Mathematics and Hum for Humanities. The first digit in the number indicates the level for which the course is intended. Odd numbered courses are theory courses and even numbered courses are sessional courses.

4.2 Course Requirement for Undergraduate Civil Engineering

1.Basic Science

Course No	Course Title	Type	Credit Hour/Week	No. of Credit	Selection Basis/ Remarks
Chem-101	Chemistry	C	3.0	3.0	
Phy-101	Physics-I	C	3.0	3.0	
Chem-102	Chemistry (Sessional)	C	3.0	1.5	
Phy-102	Physics (Sessional-I)	C	3.0	1.5	
Phy-103	Physics-II	C	3.0	3.0	
			Total Credit	12.0	

2.Mathematics

Course No	Course Title	Type	Credit Hour/Week	No. of Credit	Selection Basis/ Remarks
Math-101	Engineering Mathematics-I	C	4.0	4.0	
Math-103	Engineering Mathematics-II	C	3.0	3.0	
Math-201	Engineering Mathematics-III	C	4.0	4.0	
Math-203	Engineering Mathematics-IV	C	4.0	4.0	
			Total Credit	15.0	

C:Compulsory; O:Optional

3.Humanities

Course No	Course Title	Type	Credit Hour/Week	No. of Credit	Selection Basis/ Remarks
Hum-101	English	C	3.0	3.0	
Hum-103	Engineering Economics	C	2.0	2.0	
Hum-201	Principle of Accounting & Costing	C	3.0	3.0	
Hum-203	State and Government	O	2.0	2.0	Select one
Hum-205	Principles of Sociology	O	2.0	2.0	
			Total Credit	10.0	

4. Basic Engineering

Course No	Course Title	Type	Credit Hour/Week	No. of Credit	Selection Basis/ Remarks
CE-100	Civil Engineering Drawing	C	2.0	1.0	
CE-101	Engineering Mechanics	C	4.0	4.0	
CE-102	Computer Aided Drafting	C	2.0	1.0	
CE-105	Surveying	C	4.0	4.0	
CE-106	Practical Surveying	C	2 weeks	1.5	
EEE-151	Basic Electrical Engineering for Civil Engineering	C	3.0	3.0	
EEE-152	Basic Electrical Engineering for Civil Engineering (Sessional)	C	3.0	1.5	
CE-200	Details of Construction and Estimating	C	3.0	1.5	
CE-201	Engineering Geology & Geomorphology	C	3.0	3.0	
CE-203	Engineering Materials	C	4.0	4.0	
CE-204	Engineering Materials (Sessional)	C	3.0	1.5	
CE-205	Computer Programming and Numerical Methods in Civil Engineering	C	3.0	3.0	
CE-206	Computer Programming (Sessional)	C	3.0	1.5	
CE-208	Engineering, Planning & Architectural Appreciation	C	3.0	1.5	
CE-211	Mechanics of Materials-I	C	3.0	3.0	
CE-212	Mechanics of Materials (Sessional)	C	3.0	1.5	
CE-213	Mechanics of Materials-II	C	3.0	3.0	
CE-261	Fluid Mechanics	C	4.0	4.0	
CE-262	Fluid Mechanics (Sessional)	C	3.0	1.5	
			Total Credit	45.0	

C:Compulsory; O:Optional

5. Civil Engineering Practices

Course No	Course Title	Type	Credit Hour/Week	No. of Credit	Selection Basis/ Remarks
CE-403	Project Planning & Management	C	3.0	3.0	
CE-407	Professional Practices & Communications	O	2.0	2.0	Select One
CE- 405	Socio-economic Aspects of Development Projects	O	2.0	2.0	
CE-402	Industrial Training	C	2 weeks	1.0	
			Total Credit	6.0	

6. Structural Engineering

Course No	Course Title	Type	Credit Hour/Week	No. of Credit	Selection Basis/ Remarks
CE-311	Structural Analysis & Design-I	C	3.0	3.0	
CE-315	Design of Concrete Structure-I	C	3.0	3.0	
CE-312	Structural Analysis & Design (Sessional-I)	C	3.0	1.5	
CE-313	Structural Analysis & Design-II	C	3.0	3.0	
CE-317	Design of Concrete Structure-II	C	4.0	4.0	
CE-318	Structural Analysis & Design (Sessional- II)	C	3.0	1.5	
CE-411	Structural Analysis & Design-III	C	4.0	4.0	
CE-412	Structural Analysis and Design (Sessional-III)	C	3.0	1.5	
			Total Credit	21.5	

7.Environmental Engineering

Course No	Course Title	Type	Credit Hour/Week	No. of Credit	Selection Basis/ Remarks
CE-351	Environmental Engineering-I	C	3.0	3.0	
CE-352	Environmental Engineering (Sessional-I)	C	3.0	1.5	
CE-451	Environmental Engineering-II	C	4.0	4.0	
			Total Credit	8.5	

C:Compulsory; O:Optional

8.Geotechnical Engineering

Course No	Course Title	Type	Credit Hour/Week	No. of Credit	Selection Basis/ Remarks
CE-331	Geotechnical Engineering-I (Soil Mechanics)	C	4.0	4.0	
CE-332	Geotechnical Engineering (Sessional-I)	C	3.0	1.5	
CE-333	Geotechnical Engineering-II	C	3.0	3.0	
			Total Credit	8.5	

9.Transportation Engineering

Course No	Course Title	Type	Credit Hour/Week	No. of Credit	Selection Basis/ Remarks
CE-341	Transportation Engineering-I	C	4.0	4.0	
CE-342	Transportation Engineering (Sessional-I)	C	3.0	1.5	
CE-441	Transportation Engineering-II	C	3.0	3.0	
			Total Credit	8.5	

10.Water Resource Engineering

Course No	Course Title	Type	Credit Hour/Week	No. of Credit	Selection Basis/ Remarks
CE-361	Open Channel Flow	C	3.0	3.0	
CE-362	Open Channel Flow (Sessional)	C	3.0	1.5	
CE-363	Hydrology	C	2.0	2.0	
CE-461	Irrigation & Flood Management	C	3.0	3.0	
			Total Credit	9.5	

11.Project / Thesis

Course No	Course Title	Type	Credit Hour/Week	No. of Credit	Selection Basis/ Remarks
CE-400	Project & Thesis	C	.....	4.5	
			Total Credit	4.5	

C:Compulsory; O;Optional

12.Optional Courses

Course Title	Type	Credit Hour/week	Credit	No. of Credit	Selection Basis/Remarks
Option – I (Structural Engineering)	O	2.0 + 2.0	4.0	5.5	Choose any two options
	O	3.0 (Sessional)	1.5		
Option – II (Environmental Engineering)	O	2.0 + 2.0	4.0	5.5	
	O	3.0 (Sessional)	1.5		
Option – III (Geotechnical Engineering)	O	2.0 + 2.0	4.0	5.5	
	O	3.0 (Sessional)	1.5		
Option – IV (Transportation Engineering)	O	2.0 + 2.0	4.0	5.5	
	O	3.0 (Sessional)	1.5		
Option – V (Water Resource Engineering)	O	2.0 + 2.0	4.0	5.5	
	O	3.0 (Sessional)	1.5		
			Total Credit	11.0	

4.3 CURRICULUM STRUCTURES:

SL. No	Categories	No. of Credit
1	Basic Science	12.0
2	Mathematics	15.0
3	Humanities	10.0
4	Basic Engineering	45.0
5	Structural Engineering	21.5
6	Environmental Engineering	8.5
7	Geotechnical Engineering	8.5
8	Transportation Engineering	8.5
9	Water Resource Engineering	9.5
10	Civil Engineering Practice	6.0
11	Project / Thesis	4.5
12	Optional Courses	11.0
	Total Credit :	**160.0**

C:Compulsory; O:Optional

4.4 COURSES OFFERED IN DIFFERENT TERMS FOR B.Sc.Engg. (CIVIL) DEGREE

Level-1 Term-I B. Sc. Engg (CIVIL)

Course No	Course Title	Type	Credit Hour/ Week	No. of Credit	Selection Basis/ Remarks
CE-101	Engineering Mechanics	C	4.0	4.0	
Math-101	Engineering Mathematics-I	C	4.0	4.0	
Chem-101	Chemistry	C	3.0	3.0	
Phy-101	Physics-I	C	3.0	3.0	
Hum-103	Engineering Economics	C	2.0	2.0	
CE-100	Civil Engineering Drawing	C	2.0	1.0	
Chem-102	Chemistry (Sessional)	C	3.0	1.5	
Phy-102	Physics (Sessional-I)	C	3.0	1.5	
				Total Credit: 20.0	

Level-1 Term-II B. Sc. Engg (CIVIL)

Course No	Course Title	Type	Credit Hour/ Week	No. of Credit	Selection Basis/ Remarks
Phy-103	Physics-II	C	3.0	3.0	
Math-103	Engineering Mathematics-II	C	3.0	3.0	
Hum-101	English	C	3.0	3.0	
CE-105	Surveying	C	4.0	4.0	
EEE-151	Basic Electrical Engineering for Civil Engineering	C	3.0	3.0	
CE-102	Computer Aided Drafting	C	2.0	1.0	
CE-106	Practical Surveying	2 weeks	3.0	1.5	
EEE-152	Basic Electrical Engineering for Civil Engineering (Sessional)	C	3.0	1.5	
				Total Credit: 20.0	

C:Compulsory; O:Optional

Level-2 Term-I B. Sc. Engg (CIVIL)

Course No	Course Title	Type	Credit Hour/ Week	No. of Credit	Selection Basis/ Remarks
Math-201	Engineering Mathematics-III	C	4.0	4.0	
Hum-201	Principle of Accounting & Costing	C	3.0	3.0	
CE-203	Engineering Materials	C	4.0	4.0	
CE-205	Computer Programming and Numerical Methods in Civil Engineering	C	3.0	3.0	
CE-211	Mechanics of Materials-I	C	3.0	3.0	
CE-204	Engineering Materials (Sessional)	C	3.0	1.5	
CE-206	Computer Programming (Sessional)	C	3.0	1.5	
CE-212	Mechanics of Materials (Sessional)	C	3.0	1.5	
				Total Credit: 21.5	

Level-2Term-II B. Sc. Engg (CIVIL)

Course No	Course Title	Type	Credit Hour/ Week	No. of Credit	Selection Basis/ Remarks
CE-201	Engineering Geology & Geomorphology	C	3.0	3.0	
Hum-203	State and Government	O	2.0	2.0	Select one
Hum-205	Principles of Sociology	O	2.0	2.0	
Math-203	Engineering Mathematics-IV	C	4.0	4.0	
CE-213	Mechanics of Materials-II	C	3.0	3.0	
CE-261	Fluid Mechanics	C	4.0	4.0	
CE-200	Details of Construction and Estimating	C	3.0	1.5	
CE-208	Engineering , Planning & Architectural Appreciation	C	3.0	1.5	
CE-262	Fluid Mechanics (Sessional)	C	3.0	1.5	
				Total Credit: 20.5	

C:Compulsory; O:Optional

Level-3 Term-I B. Sc. Engg (CIVIL)

Course No	Course Title	Type	Credit Hour/ Week	No. of Credit	Selection Basis/ Remarks
CE-311	Structural Analysis & Design-I	C	3.0	3.0	
CE-315	Design of Concrete Structure-I	C	3.0	3.0	
CE-331	Geotechnical Engineering-I (Soil Mechanics)	C	4.0	4.0	
CE-351	Environmental Engineering-I	C	3.0	3.0	
CE-361	Open Channel Flow	C	3.0	3.0	
CE-312	Structural Analysis & Design (Sessional-I)	C	3.0	1.5	
CE-332	Geotechnical Engineering (Sessional-I)	C	3.0	1.5	
CE-352	Environmental Engineering(Sessional-I)	C	3.0	1.5	
				Total Credit: 20.5	

Level-3 Term-II B. Sc. Engg (CIVIL)

Course No	Course Title	Type	Credit Hour/ Week	No. of Credit	Selection Basis/ Remarks
CE-313	Structural Analysis & Design-II	C	3.0	3.0	
CE-317	Design of Concrete Structure-II	C	4.0	4.0	
CE-333	Geotechnical Engineering-II	C	3.0	3.0	
CE-341	Transportation Engineering-I	C	4.0	4.0	
CE-363	Hydrology	C	2.0	2.0	
CE-318	Structural Analysis & Design (Sessional-II)	C	3.0	1.5	
CE-342	Transportation Engineering (Sessional -I)	C	3.0	1.5	
CE-362	Open Channel Flow (Sessional)	C	3.0	1.5	
				Total Credit: 20.5	

Level-4 Term-I B. Sc. Engg (CIVIL)

Course No	Course Title	Type	Credit Hour/ Week	No. of Credit	Selection Basis/ Remarks
CE-403	Project Planning & Management	C	3.0	3.0	
CE-411	Structural Analysis & Design-III	C	4.0	4.0	
CE-441	Transportation Engineering-II	C	3.0	3.0	
CE-451	Environmental Engineering-II	C	4.0	4.0	
CE-461	Irrigation & Flood Management	C	3.0	3.0	
CE-400	Project & Thesis	C	3.0	1.5	
CE-412	Structural Analysis & Design (Sessional-III)	C	3.0	1.5	
				Total Credit: 20.0	

C:Compulsory; O:Optional

Level-4 Term-II B. Sc. Engg (CIVIL)

Course Title	Credit Hour/ week	Credit	Type	No. of Credit	Selection Basis/ Remarks
Project & Thesis (CE-400)	6.0	3.0	C	3.0	
Industrial Training (CE-402)	2 weeks	1.0	C	1.0	
Socio-economic Aspects of Development Projects (CE-405)	2.0	2.0	O	2.0	Select One
Professional Practices & Communications (CE-407)	2.0	2.0	O	2.0	
Option – I (Structural Engineering)	2.0 + 2.0	4.0	O	5.5	Student Choose any two options + Project & Thesis
	3.0 (Sessional)	1.5	O		
Option – II (Environmental Engineering)	2.0 + 2.0	4.0	O	5.5	
	3.0 (Sessional)	1.5	O		
Option – III (Geotechnical Engineering)	2.0 + 2.0	4.0	O	5.5	
	3.0 (Sessional)	1.5	O		
Option – IV (Transportation Engineering)	2.0 + 2.0	4.0	O	5.5	
	3.0 (Sessional)	1.5	O		
Option – V (Water Resource Engineering)	2.0 + 2.0	4.0	O	5.5	
	3.0 (Sessional)	1.5	O		
Total Credit: 17.0					

Criteria for selection of courses for specialization:

Students specializing in an optional group, such as Structural, Environmental, Geo-technical, Transportation & Water Resources Engineering, shall take Project/Thesis & at least two optional courses & a corresponding lab course from that group & at least two more optional courses & another corresponding lab course from any other group.

C:Compulsory; O:Optional

Option – I
Structural Engineering

Course No	Course Title	Credit Hour/Week	No. of Credit
CE-413	Structural Analysis & Design – IV	2.0	2.0
CE-415	Prestressed Concrete	2.0	2.0
CE-417	Design of Steel Structures	2.0	2.0
CE-419	Introduction to Finite Element Method	2.0	2.0
CE-421	Dynamics of Structures	2.0	2.0
CE-414	Structural Analysis & Design (Sessional– IV)	3.0	1.5
CE-416	Prestressed Concrete (Sessional)	3.0	1.5
CE-418	Design of Steel Structures (Sessional)	3.0	1.5
CE-420	Introduction to Finite Element Method(Sessional)	3.0	1.5
CE-422	Dynamics of Structures(Sessional)	3.0	1.5

Option – II
Environmental Engineering

Course No	Course Title	Credit Hour/Week	No. of Credit
CE-453	Environmental Engineering–III (Solid waste Management)	2.0	2.0
CE-455	Environmental Engineering – IV (Environmental pollution control)	2.0	2.0
CE-457	Environmental Engineering – V (Environmental Engineering Development Projects)	2.0	2.0
CE-454	Environmental Engineering (Sessional– II)	3.0	1.5
CE-456	Environmental Engineering (Sessional- III)	3.0	1.5
CE-458	Environmental Engineering (Sessional– IV)	3.0	1.5

Option – III
Geotechnical Engineering

Course No	Course Title	Credit Hour/Week	No. of Credit
CE-431	Geotechnical Engineering – III	2.0	2.0
CE-433	Geotechnical Engineering – IV	2.0	2.0
CE-435	Geotechnical Engineering – V	2.0	2.0
CE-432	Geotechnical Engineering (Sessional– II)	3.0	1.5
CE-434	Geotechnical Engineering (Sessional– III)	3.0	1.5
CE-436	Geotechnical Engineering (Sessional– IV)	3.0	1.5

C:Compulsory; O:Optional

Option – IV
Transportation Engineering

Course No	Course Title	Credit Hour/Week	No. of Credit
CE-443	Transportation Engineering – III (Traffic planning & management)	2.0	2.0
CE-445	Transportation Engineering – IV (Highway drainage & airports)	2.0	2.0
CE-447	Transportation Engineering – V (Transport projects & operations)	2.0	2.0
CE-444	Transportation Engineering (Sessional– II)	3.0	1.5
CE-446	Transportation Engineering (Sessional– III)	3.0	1.5
CE-448	Transportation Engineering (Sessional– IV)	3.0	1.5

Option – V
Water Resource Engineering

Course No	Course Title	Credit Hour/Week	No. of Credit
CE-463	Hydraulic Machinary	2.0	2.0
CE-465	Flood Mitigation & Management	2.0	2.0
CE-467	Ground Water Engineering	2.0	2.0
CE-469	River Engineering	2.0	2.0
CE-471	Hydraulic Structures	2.0	2.0
CE-473	Coastal Engineering	2.0	2.0
CE-472	Hydraulic Structures (Sessional)	3.0	1.5
CE-470	River Engineering(Sessional)	3.0	1.5

Summary of Credit Requirements

Level	Term	No. of Credit
Level – 1	Term – I	20.0
	Term – II	20.0
Level – 2	Term – I	21.5
	Term – II	20.5
Level – 3	Term – I	20.5
	Term – II	20.5
Level – 4	Term – I	20.0
	Term – II	17.0
	Total Credit :	**160.0**

C:Compulsory; O:Optional

5. Detail Outline of Undergraduate Courses

5.1 COURSES OFFERED BY THE DEPARTMENT OF CIVIL ENGINEERING:

CE-100
Civil Engineering Drawing
No. of Credit: 1.0
2 Hrs per week

Introduction: Handling instruments and their uses, Lettering and numbering and heading.

Plane Geometry: Pentagon, Hexagon, Octagon, Ellipse, Parabola, and Hyperbola.

Projection (Solid geometry): Cube, Triangle, Prism, Pentagonal prism, Hexagonal prism, Cone, Cylinder.

Development of different types of section: Cube, Triangle, Prism, Pentagonal prism, Hexagonal prism, Cone, Cylinder.

Isometric Drawing: Cube, Triangle, Prism, Pentagonal prism, Hexagonal prism, Cone, Cylinder, Interpretation of Solids.

Laws and regulations by different authorities like CDA, RAJUK, RAAUK, KDA etc. Architectural requirements, Architectural records, Architectural approaches of drawings; B.N.B.C. requirements (Part-3, Chap-1). Preliminary planning of one-unit housing, Plans, Elevations and Sections of multistoried buildings, Drawing of different types of stairs, Reinforcement details of beams, slabs, stairs etc. Plan and Section of septic tanks. Preliminary studies about planning of multistoried apartments. Skyscrapers, Auditorium, Educational Institutions, Hospital, etc., Building services (plumbing, sanitary, electrical) drawings, Auto-CAD drawing and design.

CE-101
Engineering Mechanics
No. of Credit: 4
4 Hrs per week

Introduction to Mechanics: What is mechanics? Fundamental concepts and principles, System of units, Methods of problem solution.

Forces: Definitions, Basic concepts of forces, Coplanar components of force, Rectangular components, Classification of force systems.

Free body diagrams: Definition, Procedure for drawing free body diagrams, Two force member, Gravitation force, Reactions at supports and connections, Smooth surface, Coplanar concurrent forces: Resultant of coplanar concurrent forces, Equilibrium, Equilibrium of force, The concepts of a rigid body.

Parallel coplanar forces: Moments of forces, Varignons theorem, Sign of a

Parallel coplanar forces: Moments of forces, Varignons theorem, Sign of a moment, Resultant of parallel coplanar forces, Equilibrium of coplanar parallel forces, Couples, Characteristics of couples, Torque.

Non concurrent, non-parallel coplanar forces: Resultant of a general coplanar force system, Equilibrium of a general coplanar forces system.

Trusses: Truss (Definitions), Method of sections, Joint-to Joint method, Pin-connected frames, Non-coplanar forces, Three rectangular components of a force, Concurrent force in space, Equilibrium of forces in space, Non-coplanar parallel forces in space. Equilibrium of parallel forces in space, Couples in space, Non-concurrent, non-parallel forces in space, Equilibrium of a general force system in space.

Friction: Frictional forces, Limiting frictional forces, Co-efficient of kinetic friction, Angle of friction, Wedge, Belt friction.

Centroids: Definition, Center of gravity, Mass center and centroids, Centroids of areas, Principle of symmetry, Estimating location of centroids, Integrating for centroids, Composite figures, Theorems of papous and Goldinus.

Moment of inertia of areas and masses: Moment of inertia, Rectangular moment of inertia, Polar moment of inertia, radius of Gyration.

Transfer formula: Parallel axes, Composite areas, Product of inertia.

Transfer formula for product of inertia: Parallel axes, Moment of inertia about inclined axes, Maximum and minimum moment of inertia.

Suspension Cable:

Motion: Displacement, Speed and velocity, Acceleration, Uniform motion, Variable acceleration, Angular velocity and acceleration, Trajectory.

Force system that produce rectilinear motion: Newton's law of motion, Component forces and accelerations, Motion of the center of gravity of rigid body.

Location of resultant: Body in rectilinear translation.

Work, kinetic energy and power: Work, Positive and negative works, Work of system of forces acting on a rigid body in translation, Units of work, Potential energy, Work of a couple, Kinetic energy of a rotating body, Bodies in plane motion, Frictional force in plane rolling, Power Efficiency.

Impulse and momentum: Impulse and momentum, Principle of impulse and momentum, Angular momentum, Conservation of linear momentum, Conservation of linear and angular moment, Direct central impact, Oblique impact.

CE-102
Computer Aided Drafting
No. of Credit: 1.0
2 Hrs per week

Introduction to computer usage; introduction to CAD packages and computer aided drafting: drawing editing and dimensioning of simple objects; plan, elevations and sections of multi-storied buildings; reinforcement details of beams, slabs, stairs etc; plan and section of septic tank; detailed drawings of roof trusses; plans, elevations and sections of culverts, bridges and other hydraulic structures; drawings of building services.

CE-105
Surveying
No. of Credit: 4
4 Hrs per week

Introduction to Survey, Reconnaissance Survey, Chain Survey, Traverse Survey, Plane Table Survey, Levelling and Contouring, Earthwork Calculation, Problems on height and distance. Horizontal and vertical curves, Route survey, Tachometry and Range Finding; Triangulation, Errors in surveying, Engineering Astronomy; Photogrammetry: Introduction, Terrestrial Photography, Aerial Photography; Air photo interpretation, Remote Sensing, Introduction to Global Positioning System (G.P.S.).

CE-106
Practical Surveying
No. of Credit: 1.5
2 Weeks in the field

Introduction to Survey, Chain Survey, Traverse Survey, Plane Table Survey, Leveling & Contouring, Earthwork Calculation, Problems on Height and Distance.

CE-122
Civil Engineering Drawing
No. of Credit: 0.75
1.5 Hrs per week (For EEE Dept.)

Plan-elevation and section of one storied and two storied building, Plan-elevation and section of staircase, Detail drawing of roof truss, Project on multi-storied building, Drawing using AUTOCAD or contemporary packages instructed by the teachers.

CE-200
Details of Construction and Estimating
No. of Credit: 1.5
3 Hrs per week

Foundation; Brick masonry; Framed structures and bearing walls; Arches and lintels, Details of floors and roofs; Pointing; Plastering and inferior finishing; Scaffolding.

Analysis of Rates using PWD schedule, Detailed estimate of all items of work of a building including substructure, Truss bridge, Culvert and simple girder bridge, Specification of materials for the above construction.

CE-201
Engineering Geology & Geomorphology
No. of Credit: 3
3 Hrs per week

Introduction to Engineering Geology, Minerals, Identification of minerals, Physical properties of minerals, Common rock forming minerals, Types of rocks, Fold, Fault and Joint, Weathering and erosion process, Types of Drainage, Quantitative and Qualitative Analysis of drainage basins, Geological works done by Rivers and winds, Earthquake fundamentals, Seismic map of Bangladesh, Land slides and land subsidence, Geological investigation of dams, reservoir, tunnels and highway sites, Geological succession of Bangladesh, Folded bed in Bangladesh, Faulting in Bangladesh, Seismic investigation, Tsunami and its possible effects in Bangladesh, Mineral deposits of Bangladesh.

CE-203
Engineering Materials
No. of Credit: 4
4 Hrs per week

Engineering material and their properties; Manufacturing process of bricks, pavers block, tiles and cement. Properties and uses of bricks, tiles, cement, aggregates, cement and lime mortars, standard tests of bricks, cement and aggregates; Timber, Uses of rubber and plastics; Corrosion and its prevention; Paints, Varnishes, Metallic coatings.

Concrete: Composition, Properties of fresh concrete: Mixing, Workability, Transportation, Compaction, Curing, Segregation and Bleeding, Admixture, Design of concrete mix using different codes of practices (ACI, BS), Ready-mix concrete, Properties of hardened concrete, Mechanical properties, Shrinkage, Elasticity, Plasticity, Special concrete, Durability of concrete, Factors affecting durability, Chemical attack on concrete, Chloride and sulphate attack; Concrete in sea environment, Corrosion of reinforcement in concrete, Remedial measures; Ferrocement.

CE-204
Engineering Materials (Sessional)
No. of Credit: 1.5
3 Hrs per week

General discussion on preparation and properties of concrete, Tests for specific gravity, unit weight, moisture content, and absorption of coarse and fine aggregates; Fineness, normal consistency and initial and final setting time of cement, Fineness modulus of coarse and fine aggregates, Different tests on brick, mortar and cement, Direct tensile and compressive strength of cement mortar, Design and testing of a concrete mix (using ACI & BS Code).

CE-205
Computer Programming and Numerical Methods in Civil Engineering
No. of Credit: 3
3 Hrs per week

Part-1: Basic components of computer systems, Operating systems for Micro-computers, Flow network C/C++ Language, Development of C/C++ programs and solution of problems using a computer, Applications to Civil Engineering problems.

Part-2: Numerical solution of algebraic and transcendental equations; Bisection method, Regular false method, Newton Raphson method, Iteration method (Rate of Convergence, Order of errors), Solution of systems of linear equations; Matrices, Gaussian elimination method, Gauss-Seidel iteration method. Interpolation: Simple differences, Difference tables, Difference of a polynomial, Newton's formulae for interpolation, Central difference interpolation formulae, Divided difference, Tables of divided differences, Newton's general interpolation formula, Lagrange's interpolation formula, Curve fitting by least squares, Numerical integration and differentiation (ordinary & partial), Numerical solution of differential equation. Picard's method, Euler's method and Runge-Kutta method.

CE-206
Computer Programming (Sessional)
No. of Credit: 1.5
3 Hrs per week
Based on CE-205

CE-208
Engineering , Planning & Architectural Appreciation
No. of Credit: 1.5
3 Hrs per week
Appreciation of architecture, mechanical equipments, urban and regional planning; environmental issues.

CE-209
Construction Materials
No. of Credit: 2
2 Hrs per week (For URP Dept.)
Types, preparation, properties and uses of materials- such as stone, brick, cement, sand, concrete, timber, soil, ferrous and non-ferrous metals and plastics. Specifications and quality control.

CE-211
Mechanics of Materials-I
No. of Credit: 3
3 Hrs per week

Fundamental concepts of stress and strain, Mechanical properties of materials; Strain energy; Stresses and strains in member subjected to tension, compression, shear and temperature changes, Torsional stress in shafts and tubes with different cross section, Helical springs, Stresses in thin walled pressure vessels, Bending moment and shear force diagrams of beams and frames, Flexural and shear stress in beam (Straight & Curve), Inelastic Bending of Beams.

CE-212
Mechanics of Materials (Sessional)
No. of Credit: 1.5
3 Hrs per week

Problems on stress, strain and mechanical properties of materials, Tension, direct shear and impact tests of mild steel specimens, Compressions test of timber and concrete specimens, Shear force and bending moment diagrams for practical structural components (e.g. stair-case, sunshade, bus stand shed etc.) Slender column test; Static bending test; Hardness test of metals; Torsional test of different types of materials by Torque Machine; Helical spring test, Determination of shear center, Load deflection behavior of simple beams.

CE-213
Mechanics of Materials-II
No. of Credit: 3
3 Hrs per week

Riveted and welded joints, shear center, Compound stresses; Transformation of stresses; deflection of statically determinate beam by various methods: moment area method, direct integration method, Conjugate beam method, Elastic load method) Buckling of Columns, Flexural and shear stress in beams due to unsymmetrical bending.

CE 215: Elements of Solid Mechanics
2.0 credits; 2 hours/week (for URP Dept.)

Force, resultants and components, moments and parallel coplanar forces, centroids, moment of inertia; Fundamental concepts of stress and strain; Mechanical properties of materials: Stress and strain in members subject to tensile, compressive and shear forces; Bending moment and shear force diagrams for statically determinate structures.

CE-217
Structure I: Mechanics
No. of Credit: 2
2 Hrs per week (For Arch. Dept.)
Force; Equilibrium; Free body diagram; Resultants and components; Co-planner, co-current forces; Momemts and parallel co-planner forces; Calculation of bar forces fan simple trusses; frictions; Flexible chords; moment of inertia of areas centroid.

CE 219
Structure II: Mechanics of Solids
No. of Credit: 3
3 Hrs per week (For Arch. Dept.)
Fundamental concepts of stress & strain; Mechanical properties of materials; stresses and strain in members subjected to tension, compression, shear and temparature changes; Shear force and bending moment diagrams for statically determine beams and frames.
Flexural and shearing stresses in beams; Double and area moment integration for calculaing slopes and deflections in statically determinate beams.

CE-257
Building Services I: Plumbing
No. of Credit: 2
2 Hrs per week (For Arch. Dept.)
Introduction to plumbing, water requirements, water sources; Water supply and distribution in building. Sewage and sewer system, building plumbing of multi-storied buildings; Rural sanitation programmes in Bangladesh.

CE-261
Fluid Mechanics
No. of Credit: 4
4 Hrs per week
Development and scope of fluid mechanics, Fluid properties, Fluid static's, Fluid pressure and its measurement, Application of hydrostatics, Equilibrium of floating body, Fluid mass subjected to acceleration, Fundamentals of fluid flow; Measurement of fluid flow, Venturimeters, Nozzles and pitot tubes; Bernoulli's equation, Orifice, Mouthpiece, Notch, Weirs, Flow through closed conduits, Pipes in series and parallel, Pipe networks, Viscous flow, Dimensional analysis and similitude.

CE-262
Fluid Mechanics (Sessional)
No. of Credit: 1.5
3 Hrs per week
Experiment based on CE-261

CE-281
Engineering Materials
No. of Credit: 4
4 Hrs per week (For WRE Dept.)

Engineering material and their properties; Manufacturing process of bricks, pavers block, tiles and cement. Properties and uses of bricks, tiles, cement, aggregates, cement and lime mortars, standard tests of bricks, cement and aggregates; Timber, Uses of rubber and plastics; Corrosion and its prevention; Paints, Varnishes, Metallic coatings.

Concrete: Composition, Properties of fresh concrete: Mixing, Workability, Transportation, Compaction, Curing, Segregation and Bleeding, Admixture, Design of concrete mix using different codes of practices (ACI, BS), Ready-mix concrete, Properties of hardened concrete, Mechanical properties, Shrinkage, Elasticity, Plasticity, Special concrete, Durability of concrete, Factors affecting durability, Chemical attack on concrete, Chloride and sulphate attack; Concrete in sea environment, Corrosion of reinforcement in concrete, Remedial measures; Ferrocement.

CE-282
Engineering Materials Sessional
No. of Credit: 1.5
3 Hrs per week (For WRE Dept.)

General discussion on preparation and properties of concrete, Tests for specific gravity, unit weight, moisture content, and absorption of coarse and fine aggregates; Fineness, normal consistency and initial and final setting time of cement, Fineness modulus of coarse and fine aggregates, Different tests on brick, mortar and cement, Direct tensile and compressive strength of cement mortar, Design and testing of a concrete mix (using ACI & BS Code).

CE-283
Mechanics of Solids
No. of Credit: 3
3 Hrs per week (For WRE Dept.)

Fundamental concepts of stress and strain, Mechanical properties of materials; Strain energy; Stresses and strains in member subjected to tension, compression, shear and temperature changes, Torsional stress in shafts and tubes with different cross section, Helical springs, Stresses in thin walled pressure vessels, Bending moment and shear force diagrams of beams and frames, Flexural and shear stress in beam (Straight & Curve), Inelastic Bending of Beams.

CE-284
Mechanics of Solids Sessional
No. of Credit: 1.5
3 Hrs per week (For WRE Dept.)

Problems on stress, strain and mechanical properties of materials, Tension, direct shear and impact tests of mild steel specimens, Compressions test of timber and concrete specimens, Shear force and bending moment diagrams for

practical structural components (e.g. stair-case, sunshade, bus stand shed etc.) Slender column test; Static bending test; Hardness test of metals; Torsional test of different types of materials by Torque Machine; Helical spring test, Determination of shear center, Load deflection behavior of simple beams.

CE-285
Mechanics of Solids
No. of Credit: 3
3 Hrs per week (For WRE Dept.)
Riveted and welded joints, shear center, Compound stresses; Transformation of stresses; deflection of statically determinate beam by various methods: moment area method, direct integration method, Conjugate beam method, Elastic load method, Buckling of Columns, Flexural and shear stress in beams due to unsymmetrical bending.

CE-311
Structural Analysis & Design-I
No. of Credit: 3
3 Hrs per week
Stability and determinacy of structures, Analysis of statically determinate beams, girders, frames, trusses, space trusses, flexible chord, cables and cables supported structures, Influence lines, Moving loads on beams, frames & trusses.

CE-312
Structural Analysis & Design (Sessional–I)
No. of Credit: 1.5
3 Hrs per week
Analysis and design problems: Design of members and connections of steel structures (e.g. trusses, steel plate girder and gable frames).

CE-313
Structural Analysis & Design-II
No. of Credit: 3
3 Hrs per week
Approximate analysis of statically indeterminate structures (e.g. braced trusses, portal frames, mill bent and multi-storied building frames), Portal frames and multistoried building frames under the action of vertical dead and live load and lateral loads, Wind and Earthquakes loads on structure, Long and Short period structures, Wind and earthquake forces as per BNBC-93/2006 code, Deflection of beams, frames and trusses by virtual work method, Analysis of statically indeterminate structure by three-moment equations.

CE-315
Design of Concrete Structure-I
No. of Credit: 3
3 Hrs per week
Fundamental behavior of reinforced concrete; Loads, Introduction to

Strength design and Service load design method; Analysis and design of singly reinforced beam, doubly reinforced beam and T-beam according to Strength design method; Diagonal tension, bond and anchorage according to Strength design method, Analysis and design of one-way and two-way slabs by Strip and alternate methods; Stair case, Shear walls; Introduction to ferro-cement design as per BNBC.

CE-317
Design of Concrete Structure-II
No. of Credit: 4
4 Hrs per week
Review of codes (BNBC, ACI, BS, EURO, IS, etc.); Analysis and design of columns; Introduction to slender column; footings, retaining walls, piles and pile caps according to Strength design method; Analysis and design of members subjected to torsion; Deep beam; flat plate and flat slab design by Direct design method and Equivalent frame method; Limit state design and yield-line theory; Design of reinforcement at joints, brackets and corbels; Seismic detailing of slab, beam, column, footing; Introduction to prestressed concrete.

CE-318
Structural Analysis & Design (Sessional– II)
No. of Credit: 1.5
3 Hrs per week
Analysis & Design of Slab Bridge, Deck Girder Bridge, Box Culvert & Box Girder Bridge.

CE-325
Structure III: Steel & Timber Structures
No. of Credit: 2
2 Hrs per week (For Arch. Dept.)
Steel structures; Introduction; allowable stresses; different types of trusses; wind and static load analysis of trusses; Design of truss sections; Design of steel beams, columns; Timber structures.

CE-327
Structure V: Reinforced Concrete Design
No. of Credit: 2
2 Hrs per week (For Arch. Dept.)
Fundamental of reinforced concrete design, stress design, ultimate (USD) method, analysis of reinforced concrete beams by USD design of one way and two ways by USD method. Prelilinary analysis of flat slabs, flat plate, waffle slabs, ribbed slabs, shear and diagonal tension in beams; Design of a square footing.

CE 328
Construction Practice
No. of Credit: 1.5
3 Hrs per week (For Arch. Dept.)
Practical recognition of diffeent building materials; simple tests for buildings materials and ingredients; site visits to acquaint with construction techniques and site superision. Submission of a model showing details of structural sysem using carpentry/metal works/RCC works/Brick Masonry/-composite works.

CE-329
Elements of Civil Engineering Structures
No. of Credit: 3
3 Hrs per week (For URP Dept.)
Structural forms and systems for buildings, bridges, communication and transmission structures; loads on structures; types of foundation, concept of bearing capacity and settlement, Introduction to design in reinforced and pre-stressed concrete; design codes and probision in BNBC.

CE-331
Geotechnical Engineering-I (Soil Mechanics)
No. of Credit: 4
4 Hrs per week
Introduction to geotechnical engineering, Basic properties and characteristics of soil, Soil grain and aggregate, Clay mineralogy, Weight, volume and moisture-density relationship, Soil structure and fabric, Index properties of soil, Identification and classification of soil, Principles of total and effective stress, Soil-water, Permeability, Seepage and flow nets, Fundamental of soil liquefaction. Stress distribution, Soil compaction, One-dimensional consolidation, Stress-strain-strength characteristics of soil.

CE-332
Geotechnical Engineering (Sessional-I)
No. of Credit: 1.5
3 Hrs per week
Field identification tests, Specific gravity test, Atterberg limits test, Grain size analysis by sieve and hydrometer, Relative density test, Field density test, Permeability test, Compaction test, Unconfined compression test, Direct shear test, Consolidation test.

CE-333
Geotechnical Engineering-II
No. of Credit: 3
3 Hrs per week
Techniques of sub-surface investigation, Lateral earth pressure, Seismic Lateral earth pressure, Land Slide, Slope stability, Bearing capacity of shallow & deep foundation, Settlement computation, Settlement & distortion of shallow & deep foundations.

CE-335
Principles of Soil Mechanics
No. of Credit: 4
4 Hrs per week (For WRE Dept.)
Introduction to geotechnical engineering, Basic properties and characteristics of soil, Soil grain and aggregate, Clay mineralogy, Weight, volume and moisture-density relationship, Soil structure and fabric, Index properties of soil, Identification and classification of soil, Principles of total and effective stress, Soil-water, Permeability, Seepage and flow nets, Fundamental of soil liquefaction. Stress distribution, Soil compaction, One-dimensional consolidation, Stress-strain-strength characteristics of soil.

CE-336
Geotechnical Engineering Sessional
No. of Credit: 1.5
3 Hrs per week (For WRE Dept.)
Field identification tests, Specific gravity test, Atterberg limits test, Grain size analysis by sieve and hydrometer, Relative density test, Field density test, Permeability test, Compaction test, Unconfined compression test, Direct shear test, Consolidation test.

CE-337
Foundation Engineering
No. of Credit: 3
3 Hrs per week (For WRE Dept.)
Soil investigation techniques; Various types of foundation & factors affecting their selection. Bearing capacity of shallow & deep foundation, settlement & distortion foundations. Design and construction of footings, rafts & piles, slope stability analysis.

CE-341
Transportation Engineering-I
No. of Credit: 4
4 Hrs per week
Introduction to transportation Engineering, Development of transportation systems, Elements of transportation system, Transportation in Bangladesh; Modal share; Transportation planning concepts; Highway location surveys considering seismic factors, Collection, study and analysis of basic data; Highway location and surveys; Geometric design of highways; Elements of design, Cross-section elements, Curves and sight distances; Road intersections; Traffic engineering; The road/traffic system, Vehicle and traffic characteristics, Traffic control devices, Traffic studies, Parking and roadway lighting. Railways: General requirements, Alignment, Permanent way, Station and yards, Signaling, Points and crossings, Maintenance.

CE-342
Transportation Engineering (Sessional-I)
No. of Credit: 1.5
3 Hrs per week
Test on bituminous materials, Tests on sub-grade, Sub-base and base materials, Bituminous mix design.

CE-351
Environmental Engineering-I
No. of Credit: 3
3 Hrs per week
Introduction to Environmental Engineering: ecology and environment; climate change; biodiversity.
Water Supply Engineering: introduction; water demands; water supply sources; ground water exploration: aquifer properties and ground water flow, well hydraulics, water well design,
drilling, construction and maintenance; water demand for rural communities; shallow hand tube wells, deep tube wells, deep set pumps and alternative water supplies for problem areas.
Surface water collection and transportation; head works; pumps and pumping machineries; water distribution systems; analysis & design of distribution network; fire hydrants; water meters; leak detection; Plumbing system for water supply; unaccounted for water.
Water quality and treatment: water quality parameters and standards; water treatment- plain sedimentation, coagulation, flocculation, filtration, disinfection; miscellaneous treatment methods; Membrane Technology for water treatment; small scale iron removal unit; Effects of Arsenic and its mitigation. Arsenic removal plant; low cost treatment methods for rural communities; water safety plans.

CE-352
Environmental Engineering (Sessional-I)
No. of Credit: 1.5
3 Hrs per week
Water and wastewater sampling techniques, sample preservation; Physical, chemical and bacteriological tests of water and wastewater; Design of water supply system.

CE-353
Environmental Engineering
No. of Credit: 4
4 Hrs per week (For WRE Dept.)
Introduction to environmental engineering. Water supply: water requirement, water sources, water quality, treatment and distribution systems, design concepts of water treatment plants. Water engineering: wastewater characteristics, treatment and disposal, on site sanitation systems. Solid waste management.

Introduction to environmental pollution: water, air, soil and noise pollution: effects of pollution. Introduction to environmental management: environmental policy, legislation and environmental quality standards: introduction to environmental impact assessment.

CE-354
Environmental Engineering Sessional
No. of Credit: 1.5
3 Hrs per week (For WRE Dept.)
Water and wastewater sampling techniques, sample preservation; Physical, chemical and bacteriological tests of water and wastewater; Design of water supply system.

CE- 355
Environmental Pollution and Solid Wast Management
No. of Credit: 3
3 Hrs per week (For WRE Dept.)
Solid Waste Management: sources and types of solid wastes; physical and chemical properties of solid wasters; solid wastes generation; on-site handling storage and processing; collection of solid wastes; transfer stations and transport; ultimate disposal methods; resources and energy recovery; Industrial solid waste collection and disposal; hazardous waste management.
Environment pollution and its control:
Water pollution: sources and types of pollutants; waste assimilation capacity of streams; dissolved oxygen modeling; ecological balance of streams; industrial pollution; heavy metal contamination; detergent pollution and eutrophication; marine pollution; pollution control measures: water quality monitoring and management.
Air pollution: sources and types of pollutants; effects of various pollutants on human health, materials and plants, air pollution meteorology; global warming and greenhouse effects; air pollution monitoring and control measures; Introduction to air quality models.

CE-357
Introduction to Environmental and Disaster Engineering
No. of Credit: 2
2 Hrs per week (For Arch. Dept.)
Waste water & ETP, Environmental assesment; Water sources and quality, water pollution & its consequences, solid waste management, environmental management, sustainable development , industrial pollution.
Introduction to Earthquake, wind/cyclone, flood engineering, land slide & its mitigation, disaster management & challenges.

CE-359
Basic Environmental Engineering
No. of Credit: 3
3 Hrs per week (For URP Dept.)
Water supply: objectives and basic elements of water supply system; water

requirements; population prediction and water demand assessment; fire demand; planning of water supply systems- sources, abstraction, transmission, treatment and distribution.
Sanitation: urban and rural sanitation; low-cost sanitation technologies; elements of a conventional water borne system- collection, transportation, treatment and disposal; planning of sanitation systems. Environmental pollution- air, water and soil, and noise pollution.

CE-361
Open Channel Flow
No. of Credit: 3
3 Hrs per week
Open channel flow and its classification, Properties of open Channel, Velocity and pressure distributions, Energy equation and momentum principles, Critical flow, its computation and application, Concept of uniform flow: Development of uniform flow and its formulas, Computation of uniform flow, Design of channels for uniform flow, Gradually varied flow: Theory and Analysis, Rapidly varied flow: Introduction, flow over spillways, Hydraulic jump and its use as energy dissipation, Channel design by regime concept method, Lacey method and Kennedy method with respect to Bangladesh.

CE-362
Open Channel Flow (Sessional)
No. of Credit: 1.5
3 Hrs per week
Broad-crested weir, Sluice gate, Venturi flume, Parshall flume, Cutthroat flume, Hydraulic jump, Velocity distribution profile, Manning's roughness coefficient, Specific force and specific energy.

CE-363
Hydrology
No. of Credit: 2
2 Hrs per week
Concepts of hydrology, Hydrologic cycle, Weather and Hydrology, Precipitation, Evaporation and transpiration, Infiltration, Stream flow and stream gauging, Rainfall-runoff relationship, Hydrographs, Unit hydrographs, Hydrographs of overland flow, Hydrologic routing, Statistical methods in hydrology. Principles and practices of IWRM, IWRM toolbox, Concept and practice of water governance, Concept of hydrological modeling for IWRM, equity and social justice of WRM in Bangladesh with case studies.

CE-365
Water Resources & Drainage Planning
No. of Credit: 3
3 Hrs per week (For URP Dept.)
Hydrologic cycle, precipitation, stream flow, evaporation and transpiration, rainfall-runoff relationship, hydrograph analysis, storm water drainage, groundwater occurrence and wells; behavior of alluvial rivers, Introduction

to dredging, river training and bank protection works; flood mitigation approaches; Drainage planning; Case study: Storm water drainage of Chittagong.

CE-381
Structural Analysis and Design-I
No. of Credit: 4
4 Hrs per week (For WRE Dept.)
Stability and determinacy of structures; analysis of statically determinate trusses and arches; influence lines; moving loads on beams, frames and trusses; analysis of suspension bridge.
Wind and earthquake loads; approximate analysis of statically indeterminate structures: braced trusses, portal method, cantilever method and vertical load analysis of multi storied building frames; deflection of beams, trusses and frames by virtual work method.

CE-382
Structural Analysis and Design Sessional
No. of Credit: 1.5
3 Hrs per week (For WRE Dept.)
Analysis and design problems: Design of members and connections of steel structures (e.g. trusses, steel plate girder and gable frames).

CE-383
Structural Analysis and Design-II
No. of Credit: 3
3 Hrs per week (For WRE Dept.)
Analysis of statically indeterminate beams and frames by moment distribution, consistent deformation/flexibility and stiffness methods; algorithms for implementing direct stiffness method in a computer; influence lines of statically indeterminate beams and frames.

CE-385
Design of Concrete Structure – I
No. of Credit: 3
3 Hrs per week (For WRE Dept.)
Fundamental behavior of reinforced concrete; Loads, Introduction to Strength design and Service load design method; Analysis and design of singly reinforced beam, doubly reinforced beam and T-beam according to Strength design method; Diagonal tension, bond and anchorage according to Strength design method, Analysis and design of one-way and two-way slabs by Strip and alternate methods; Stair case, Shear walls; Introduction to ferrocement design as per BNBC.

CE-386
Concrete Structures Design Sessional-I
No. of Credit: 1.5
3 Hrs per week (For WRE Dept.)
Analysis and design problems based on CE-385; design of a slab bridge, balanced cantilever bridge and a low-rise building.

CE-387
Design of Concrete Structures – II
No. of Credit: 4
4 Hrs per week (For WRE Dept.)
Review of codes (BNBC, ACI, BS, EURO, IS, etc.); Analysis and design of columns; Introduction to slender column; footings, retaining walls, piles and pile caps according to Strength design method; Analysis and design of members subjected to torsion; Deep beam; flat plate and flat slab design by Direct design method and Equivalent frame method; Limit state design and yield-line theory; Design of reinforcement at joints, brackets and corbels; Seismic detailing of slab, beam, column, footing; Structural forms; Introduction to prestressed concrete.

CE-400
Project & Thesis
No. of Credit: 4.5
Experimental & theoretical investigation of various topics in Structural Engineering, Concrete Technology, Environmental Engineering, Transportation Engineering, Water Resources Engineering & Geotechnical Engineering, individual or group study of one or more topic from any one the above fields. Presentation of the theoretical background, methodology & plan for the completion of the project/thesis within 6th cycles in a seminar in the Civil Engineering Department. Students will be required to submit thesis/project report and presentation of the same at the end of the work.

CE-402
Industrial Training
No. of Credit: 1.0
2 Weeks

CE-403
Project Planning & Management
No. of Credit: 3
3 Hrs per week
Principles of management, Principles of construction management, Construction contracts and specifications, Inspection and quality control, Construction safety, Construction planning and scheduling PERT, CPM, Resource scheduling, Psychology in administration, Demand forecasting, Project planning and evaluation, Feasibility reports, Cash flow, Pay back period, Internal rate of return, Benefit-cost ratio, Construction equipments and plants. Inventory control, Linear Programming.

CE 405
Socio-economic Aspects of Development Projects
No. of Credit: 2
2 Hrs per week

Economics and social structure; development and economic growth; socio-economic indicators; concept of human development, human development index; gender related human development index; poverty reduction strategies in Bangladesh; concepts of sustainable development; MDGs.
Characteristics of development projects; human interest related aspects; population displacement; resettlement and rehabilitation strategy;
Productivity; land loss, land use and land ownership patterns; deforestation and afforestation; commerce, industries and other economic benefits;
Socio-economic impact assessment approach; socio-economic survey; case studies.

CE 407
Professional Practices and Communication
No. of Credit: 2
2 Hrs per week

Code of practices: BNBC, ECR, NWP;WSP; Nirman Bidimala; Procurement regulations and law: PPA 2008, PPR 2010; Professional ethics.
Techniques of effective communication in professional environment; Writing techniques of research paper, memos and technical reports; oral presentation of reports; writing proposals; preparing effective speaking and successful inter personal communications; job application process: interviews and follow-ups.

CE-411
Structural Analysis & Design-III
No. of Credit: 4
4 Hrs per week

Analysis of statically indeterminate structures by displacement method, Column analogy method, slope deflection method, Moment distribution method, Stiffness matrix; Member stiffness; Stiffness transformations, Assembly of stiffness matrices & solution for beams, frames & plane trusses, Analysis of statically indeterminate structure (plane frames, trusses, girders) by method of consistent deformation; Flexibility Matrix. Influence line for statically indeterminate beams, frames, arches & girders; Structural frames and their application considering seismic and wind effects (e.g. shear wall, frame, Tube-in tube etc).

CE-412
Structural Analysis and Design (Sessional- III)
No. of Credit: 1.5
3 Hrs per week

Analysis & Design of RC buildings and multispan bridges.

CE-413
Structural Analysis & Design-IV
No. of Credit: 2
2 Hrs per week
Introduction to theory of elasticity, Plane stress and plain strain condition; Two-dimensional problems in rectangular and polar coordinates; Torsion of circular and non-circular shafts; Instability of structures; Stability functions.

CE-414
Structural Analysis & Design (Sessional-IV)
No. of Credit: 1.5
3 Hrs per week
Design of various reinforced concrete structures, e.g. water tower, rigid frame bridge, folded plate roof.

CE-415
Prestressed Concrete
No. of Credit: 2
2 Hrs per week
Prestressed Concrete: Materials; Prestressing systems, Loss of prestress; Analysis of sections for flexure, Shear, bond and bearing; Beam deflections and cable layout; Partial prestress, Design of prestressed sections for flexure, shear, bond and bearing.

CE-416
Prestressed Concrete (Sessional)
No. of Credit: 1.5
3 Hrs per week
Design of a balanced cantilever bridge.

CE-417
Design of Steel Structures
No. of Credit: 2
2 Hrs per week
Behavior of structural steel members and steel frames; Code requirements; Design of tension and compression members by WSD and LFD methods; Design of beam, Beam-columns; Joint design.

CE-418
Design of Steel Structures (Sessional)
No. of Credit: 1.5
3 Hrs per week
Design of members & connections of steel structures: Plate girders.

CE-419
Introduction to Finite Element Method
No. of Credit: 2
2 Hrs per week
Introduction to finite element method as applied to Civil Engineering problems, One-dimensional stress deformation and time depended flow problems, Two-dimensional plane stress and plane strain, Analysis of stress deformation problems.

CE-420
Introduction to Finite Element Method (Sessional)
No. of Credit: 1.5
3 Hrs per week
Problem based on CE-419.

CE-421
Dynamics of Structures
No. of Credit: 2
2 Hrs per week
Formulation of equation of motion; Free vibration response; SDOF and MDOF system; Response to harmonic and impulse loading, Vibration analysis by Rayleigh's method.

CE-422
Dynamics of Structures (Sessional)
No. of Credit: 1.5
3 Hrs per week
Sessional based on CE-421.

CE-427
Structure V: Elements of Building Structure
No. of Credit: 2
2 Hrs per week (For Arch. Dept.)
Reinforced concrete columns, stocky and long. Preliminary analysis of column section in multistoried buildings; Grids, approximate analysis. Approximate analysis of multistoried building for gravity and lateral loads. Introduction to shear-walls- preliminary design, introduction and preliminary design of arches, domes and shells. Folded plates. Vierendeel truss.

CE-431
Geotechnical Engineering-III
No. of Credit: 2
2 Hrs per week
Various types of foundation & factors affecting their selection, Design and construction of shallow foundation, Footings & rafts, Retaining wall, Sheet piles, Dewatering & slurry-wall construction.

CE-432
Geotechnical Engineering (Sessional-II)
No. of Credit: 1.5
3 Hrs per week
Design problems based on CE-431.

CE-433
Geotechnical Engineering-IV
No. of Credit: 2
2 Hrs per week
Braced cut, Cofferdams, Caissons, Pile & pier foundation, Machine foundation.

CE-434
Geotechnical Engineering (Sessional- III)
No. of Credit: 1.5
3 Hrs per week
Design problems based on CE-433

CE-435
Geotechnical Engineering-V
No. of Credit: 2
2 Hrs per week
Ground improvement techniques: Mechanical & hydraulic modification, Modification by inclusion & confinement, Physical & chemical modification. Reinforced earth wall, One, Two & Three dimensional consolidation, Pore pressure coefficients, Soil-structure interaction, Theory of soil liquefaction, Case study for cities of Bangladesh, Sample example solved for soil liquefaction, SHANSEP & stress path methods, Capillarity and soil suction.

CE-436
Geotechnical Engineering (Sessional- IV)
No. of Credit: 1.5
3 Hrs per week
Design problems based on CE-435.

CE-441
Transportation Engineering-II
No. of Credit: 3
3 Hrs per week
Highway materials; Sub grade, Sub base and Base courses; Soil stabilization and soil aggregates in road constructions; Low-cost roads; Production. Properties and uses of bituminous materials and mix design methods; Design, construction and maintenance of flexible and rigid road pavements; pavement construction equipments; Highway intersection design.

CE-442
Transportation Engineering Sessional
No. of Credit: 1.5
3 Hrs per week (For WRE Dept.)
Test on bituminous materials, Tests on sub-grade, Sub-base and base materials, Bituminous mix design.

CE-443
Transportation Engineering-III
(Traffic planning & management)
No. of Credit: 2
2 Hrs per week
The transportation planning process; Traffic management concepts; Traffic accident investigations; City road and street networks; Grade separation and interchanges, Pedestrian and bicycle facilities. The urban bypass; Environmental aspects of highway traffic and transportation projects; Elements of traffic flow.

CE-444
Transportation Engineering (Sessional-II)
No. of Credit: 1.5
3 Hrs per week
Sessional based on CE-443

CE-445
Transportation Engineering-IV
(Highway drainage & airports)
No. of Credit: 2
2 Hrs per week
Highways drainage and drainage structures, Evaluation and strengthening of pavements; Importance, advantages and trends in air transportation; Planning and design of airports; Aircraft characteristics related to airport design; Types and elements of airport planning studies; Airport configuration; Geometric design of the landing area; Terminal area; Heliports; Design of airport pavements; Lighting, Marking and signing; Airport drainage.

CE-446
Transportation Engineering (Sessional- III)
No. of Credit: 1.5
3 Hrs per week
Sessional based on CE-445.

CE-447
Transportation Engineering-V
(Transport projects & operations)
No. of Credit: 2
2 Hrs per week
Highway needs study; Highway planning, Economics and financing; Evaluation and analysis of transportation projects, Management, Monitoring; Organization and implementation of transportation projects; Selected case studies; Traffic engineering administration and legislation; Urban public transportation and freight movement.

CE-448
Transportation Engineering (Sessional-IV)
No. of Credit: 1.5
3 Hrs per week
Sessional based on CE-447.

CE-449
Transportation Engineering
No. of Credit: 4
4 Hrs per week (For WRE Dept.)

Introduction to transportation Engineering, Development of transportation systems, Elements of transportation system, Transportation in Bangladesh; Modal share; Transportation planning concepts; Highway location surveys considering seismic factors, Collection, study and analysis of basic data; Highway location and surveys; Geometric design of highways; Elements of design, Cross-section elements, Curves and sight distances; Road intersections; Traffic engineering; The road/traffic system, Vehicle and traffic characteristics, Traffic control devices, Traffic studies, Parking and roadway lighting. Railways: General requirements, Alignment, Permanent way, Station and yards, Signaling, Points and crossings, Maintenance.

CE-451
Environmental Engineering-II
No. of Credit: 4
4 Hrs per week

Wastewater Engineering: Introduction; estimation of wastewater; wastewater collection systems; hydraulics of sewer; design, construction and maintenance of sanitary sewer and storm drainage system: sewer appurtenances; plumbing system for wastewater drainage.

Microbiology of wastewater; wastewater characteristics; wastewater treatment and disposal; treatment and disposal of industrial effluents; sludge treatment and disposal; Advanced treatment of wastewater; Membrane Technology; sanitation and health; low cost sanitation technology; septic tank system: design and construction; Introduction to Best Management Practices (BMPs) in water and wastewater engineering.

Sustainability of water and sanitation services; Socio-economic aspects of WSS services; participatory development approach in water and sanitation sector; Gender balance and sensitivity; community management of water and sanitation services.

Health & Hygiene: Disease description, transmission and control, hygiene educational scope and methodology, social mobilization for hygiene practice; integrated approach for water, sanitation and health education.

CE-453
Environmental Engineering-III
(Solid waste Management)
No. of Credit: 2
2 Hrs per week

Solid Waste Management: Sources and types of solid wastes; Physical and chemical properties of solid wasters; Solid wastes generation; On-site handling, storage and processing; Collection of solid wastes; Transfer stations

and transport; Ultimate disposal methods; Resources and energy recovery; Soil pollution, Industrial solid waste collection and disposal; Hazardous waste management.

CE-454
Environmental Engineering (Sessional-II)
No. of Credit: 1.5
3 Hrs per week
Design of water treatment plants; Design of sewerage system; Laboratory analysis of air, water, wastewater and solid wastes and interpretation of tests results, Design of effluent treatment plant (ETP)

CE-455
Environmental Engineering-IV
(Environmental pollution control)
No. of Credit: 2
2 Hrs per week
Environment pollution and its control:
water pollution: sources and types of pollutants; waste assimilation capacity of streams; dissolved oxygen modeling; ecological balance of streams; industrial pollution; heavy metal contamination; detergent pollution and eutrophication; groundwater pollution; marine pollution; pollution control measures: water quality monitoring and management.
Noise Pollution: Introduction to noise pollution and their effects;
Air pollution: sources and types of pollutants; effects of various pollutants on human health, materials and plants, air pollution meteorology; global warming and greenhouse effects; air pollution monitoring and control measures; Introduction to air quality models.

CE-456
Environmental Engineering (Sessional-III)
No. of Credit: 1.5
3 Hrs per week
Sessional based on CE-455.

CE-457
Environmental Engineering-V
(Environmental Engineering Development Projects)
No. of Credit: 2
2 Hrs per week
Environment and Development Projects; Environment and sustainable development; Environmental policies and legislation; Environmental implication of sectoral development; Environmental quality standards; Environmental issues and priorities; Environmental impact assessment of development schemes-baseline studies, Assessment methodologies; Economics of environmental management; Special topics.

CE-458
Environmental Engineering (Sessional-IV)
No. of Credit: 1.5
3 Hrs per week
Sessional based on CE-457.

CE-461
Irrigation & Flood Management
No. of Credit: 3
3 Hrs per week
Importance of irrigation, Sources and quality of irrigation water, Methods of irrigation, Soil-water relationship, Consumptive use and estimation of irrigation water requirements, Design of irrigation canal system, Water logging, Drainage system in irrigated land, Flood and its control, Causes of flood & its remedies, Meandering of rivers, Cut Off and its effects, River training and its methods, Bank protection, Dredging and dredgers.
Concept and Practices of participatory design, Participatory management of irrigation projects, Irrigation water market in developing countries.

CE-463
Hydraulic Machinery
No. of Credit: 2
2 Hrs per week
Impact of water jets, Centrifugal, reciprocating and rotary pumps, Impulse and reaction turbines, Pelton wheel.

CE-465
Flood Mitigation and Management
No. of Credit: 2
2 Hrs per week
Methods of flood management: Structural and non-structural measures such as reservoirs, levees and flood walls, Channel improvement, Floodways, Land management, Flood proofing, Flood zoning, Flood hazard mapping, Flood forecasting and warning, Post flood damage assessment and rehabilitation.

CE-467
Groundwater Engineering
No. of Credit: 2
2 Hrs per week
Groundwater in hydrologic cycle and its occurrence, Physical properties and principles of ground water movement, Groundwater and well hydraulics, Groundwater resource evaluation, Groundwater levels and environmental influences, Water mining and land subsidence, Groundwater pollution and contaminant transport, Recharge of groundwater, Saline water intrusion in aquifers, Groundwater management.

CE-469
River Engineering
No. of Credit: 2
2 Hrs per week
Behaviour of alluvial rivers, River channels pattern and fluvial processes, Aggradation and degradation, Local scour, Navigation, Sediment movement in river channels, Bed forms and flow regimes.

CE-470
River Engineering (Sessional)
No. of Credit: 1.5
3 Hrs per week
Based on CE-469

CE-471
Hydraulic Structures
No. of Credit: 2
2 Hrs per week
Principles of design of hydraulic structures, Types of hydraulic structures, Design of dams: Earthen and Gravity dams, Seismic design of Dam, Barrages, Weirs, Spillways, Spillway gates, Cross drainage works.

CE-472
Hydraulic Structures (Sessional)
No. of Credit: 1.5
3 Hrs per week
Design based on CE-471.

CE-473
Coastal Engineering
No. of Credit: 2
2 Hrs per week
Coast and coastal features, Tides and currents, Tidal flow measurement, Waves and storm surges, Docks and harbors, Forces of waves and tides in the design of coastal and harbor structures, Coastal sedimentation processes, Deltas and estuaries, Shore protection works.

CE-482
Concrete Structures Design Sessional-II
No. of Credit: 1.5
3 Hrs per week (For WRE Dept.)
Computer applications in the analysis of buildings and PC Girder Bridge; Design of a multistoried RCC frame residential building and a simple span PC girder bridge.

5.2 COURSES OFFERED BY THE DEPARTMENT OF ELECTRICAL AND ELECTRONIC ENGINEERING

EEE-151
Basic Electrical Engineering for Civil Engineering.
No. of Credit: 3
3 Hrs per week

Electrical units and standards, Electrical circuit-laws, Kirchhoffs voltage and current laws, Transmission line, Circuit solution: Series, Parallel; Y-transformation and Mesh current methods, Network theorem: Superposition. Thevenin's and Norton's, Current sources, Equivalence of voltage and current sources. Alternating instantaneous voltage current and power, RMS and AVG values of A.C. Quantities, Phasor algebra as applied to A.C. circuit analysis, Vector diagrams for single phase series and parallel circuits. D.C. generation: Principle, Operation, Classification, Characteristics.

D.C. Motor: Principle, Operation, Classification, Speed control and starting, Transformer: Operation, Performance and testing, Induction motor: Principle, operation, Configuration, Transistor biasing. Simple amplifiers and oscillators.

EEE-152
Basic Electrical Engineering for Civil Engineering (Sessional)
No. of Credit: 1.5
3 Hrs per week

Experiments based on EEE-122: Measurement of electrical quantities: Current, Voltage, Resistance; Ammeter, Voltmeter, Wattmeter and circuit theorems. Measurement of AC quantities, Application of AC circuit analysis, House wiring, Generator and motor based experiments, Transformer and PN diode related experiment.

5.3 COURSES OFFERED BY THE DEPARTMENT OF PHYSICS

Phy-101
Physics-I
No. of Credit: 3
3 Hrs per week

Physical Optics: Interference of light: Theory of interference, Young's double slit experiment, Fresnel Bi-prism, Interference in thin films: Interference by multiple reflections: constant and varying thickness, Newton's rings and its application.

Diffraction of light: Fresnel and Fraunhofer diffraction, Fraunhofer diffraction by single slit and double slit, plane diffraction grating.

Polarization: Production and analysis of polarized light, Brewster's law, Malus' law, Polarization by double refraction Nicol prism, Polaroid, Optical activity, polarimeters.

Properties of matter: Different states of matter, Review of Elastic properties of solids, bending of beam, Cantilever.

Hydrodynamics: Equation of continuity, Laminar and turbulent flow, Reynolds number and its significance, Bernoulli's Theorem.

Viscosity: Poiseulle's equation, Motion in a viscous medium, Stokes law: statement and Determination of coefficient of viscosity.

Surface tension: Surface tension, force of cohesion, force of surface tension, molecular theory of surface tension, surface energy, Calculation of excess pressure inside a curved membrane, Capillarity, Quinck's method.

Waves and Oscillations: Differential equation of a simple harmonic motion, total energy and average energy, combination of simple harmonic oscillation, Lissajous figures, spring-mass system, time period of torsional pendulum; damped oscillation, determination of damping co-efficient, forced oscillation, Resonance, two-body oscillations, reduced mass. Differential equation of a progressive wave, power and intensity of wave motion, stationary wave, group velocity and phase velocity. Architectural acoustics, reverberation and Sabine's formula.

Phy-102
Physics (Sessional-I)
No. of Credit: 1.5
3 Hrs per week

Determination of Young's modulus for the material of a wire using searle's apparatus; Determination of modulus of rigidity of a wire (Dynamical method); Determination of surface tension of mercury and the angle of contact (Quinck's method); Determination of coefficient of viscosity of glycerin using stoke's law; Determination of mechanical equivalent of heat 'J' by electrical method; Determination of the radius of curvature of a lens (Newton's ring experiment); Determination of the thermal conductivity of a bad conductor by Lee's method; Determination of the frequency of a turning fork by Melde's experiment; Determination of the specific rotation of sugar solution by means of a polarimeter; Calibration of a thermo-couple Thermometer and hence to measure an unknown temperature.

Phy-103
Physics-II
No. of Credit: 3
3 Hours per week

Introduction to Solid State Physics: Crystalline and non-crystalline solids, single crystal and polycrystalline solids, crystal systems; co-ordination number, packing fraction, reciprocal lattice, inter-planer spacing, X-rays: production, Moseley's law and practical application of X-rays. Bragg's law, XRD, XRF, Methods of determination of inter-planar spacing from diffraction patterns; Defects in solids: point defects, line defects. Different types of bonds in solids, cohesive and bonding energy, metal, insulator and semiconductor in terms of energy band.

Thermodynamics: Measurements of temperatures, resistance and thermocouple thermometers, pyrometry; radiation pyrometers.

Transmission of heat: Fourier equation of heat flow, steady state and periodic heat flow in one dimension, determination of thermal conductivity of good and bad conductors, heat flow through compound walls.

Review of the laws of thermodynamics, Carnot's theorem, entropy, thermodynamic functions, Maxwell thermodynamic relations, Clausius-Clapeyron equation, Gibbs phase rule, third law of thermodynamics, Nernst heat theorem.

Modern Physics: Michelson Morley's experiment, Gallilean transformation, special theory of relativity, Lorentz transformation, length contraction, simultaneity and time dilation, variation of mass, mass energy relation, energy momentum relation, twin paradox.

Quantum effect: photo-electric effect, Compton effect, wave particle duality, de Broglie wave, interpretation of Bohr's postulates.

Radioactivity and nuclear Physics: Radioactivity, radioactive disintegration, radioactive equilibrium. Nuclear binding energy, nuclear reactions, fission, fusion, chain reaction, nuclear reactor: types and essential components and working principle.

5.4 COURSES OFFERED BY THE DEPARTMENT OF CHEMISTRY

Chem-101
Chemistry
No. of Credit: 3
3 Hrs per week

Classification of Elements: Periodic properties of elements, Electronic configuration, Alkali & alkaline earth metals, Transition elements, inert gases, Structure & properties of Boron, Silicon, Germanium, Arsenic & Antimony, semiconductors.

Solutions: Types of Solution, Henry's Law, Solubility, Factor's affect on solubility, Solubility curves, Nernst distribution law, Solvent extraction, Colligative properties of dilute solutions.

Colloids: Definition, Classification, Preparation, Purification, Properties, Sols, Gels, Emulsions, coagulation, Gold number, Applications.

Chemical Bonding: Different types of chemical bonds, Metallic bond, Hydrogen bond/Hybridization, Shapes of molecules, properties of ionic, covalent & coordinate compounds, Valence bond theory, Molecular orbital theory & linear combination of atomic orbital (LCAO) theory, Molecular symmetry & group theory.

Polymer: Synthetic and natural polymers, plastics and fibers, thermosetting and thermoplastic polymers, natural and synthetic rubber, manufacturing of different rubber, compounding and vulcanization of rubber, classification and properties of resins, plasticizer, manufacturing of bakelite, PVC, polythene, vinyl acetate, cellulose acetate etc. Manufacturing, uses and properties of Nylon, Polyesters, Acrylic Fibers and Co-polymers.

Basic in Environmental Chemistry: Introduction to environmental chemistry, Environmental segments, Atmospheric structure, Chemical species and particulates present in the atmosphere, reactions in atmosphere. Air pollution: classification, sources, effects and prevention, Acid rain, ozone hole, Green House gases, Global warming. Water pollution: Definition, Classification of water pollutants,

Corrosion and its prevention: Classifications, Theories of electrochemical corrosion and evidence in its support, influence of different factors on corrosion, Passivity, Different forms of corrosion: stray current corrosion, grain boundary corrosion, pitting, erosion corrosion, stress corrosion, microbiological corrosion etc. Corrosion in concrete, Effect of chloride ions, Prevention of corrosion in concrete, corrosion of sewer pipe, Corrosion prevention: Material selection, Alteration of environment, Inhibitors, Cathodic Protection, Stray current effect, Anodic protection, Protective coatings.

Chemistry of Cement: Composition, properties, Raw materials, Dry and wet process, Reactions in rotary kiln.

Chem-102
Chemistry (Sessional)
No. of Credit:1.5
3 Hrs per week

Oxidation-reduction titration: Name of the experiment: (a) preparation of standard sodium oxalate solution and (b) Standardization of potassium permanganate solution.

Iodometric titration: Name of the experiment: preparation of standard potassium dichromate solution and standardization of sodium tri sulphate solution.

Determination of Fe: Name of the experiment: Determination of Ferrous ion with standard KMnO4 solution.

Determination of Cu: Name of the experiment: Determination of copper Iodometrically with standard Na2S2O3 solution.

Determination of Ca: Name of the experiment: Determination of calcium in CaCO3.

Analysis of brass: Name of the experiment: Estimation of Zn and Cu in brass. Indometric titration, Complexometric Titration, Determination of Fe, Ni, Cu and Ca analysis of brass, Determination of Specification value, Iodine value and Acid value, Analysis of unknown salts. Preparation of standard sodium oxalate solution and standardization of potassium permanganate solution; Determination of Ferrous iron with standard KMnO4 solution; Preparation of standard potassium dichromate (K2Cr2O7) solution and Standardization of sodium thiosulphate solution; Determination of Copper iodiometrically with standard sodium thiosulphate solution; Determination of calcium in calcium carbonate; Estimation of Zinc and Copper for analysis of brass.

5.5 COURSES OFFERED BY THE DEPARTMENT OF MATHEMATICS

Math-101
Engineering Mathematics- I
No. of Credit: 4
4 Hrs per week

Differential Calculus: Limit, Continuity and Differentiability of functions, Derivatives of real functions. Higher order derivatives and Leibnitz's theorem. Rolle's theorem, Mean value theorem. Taylor's theorem with Remainder. Expansion of functions. Indeterminate forms. Tangent and Normal – Cartesian and Polar curves. Lengths of tangent, normal, subtangent and subnormal. Functions of several variables. Partial and total derivatives. Homogeneous functions, Euler's theorem. Maxima and Minima of functions of more than one variables. Curvature, Radius of curvature, Centre of curvature.

Integral Calculus: Techniques of integration, Standard integrals, Integration of rational fractions, Reduction formulae. Definite integrals. Integral as the limit of sum, Improper integrals, Gamma and Beta functions. Lengths of curves, Areas of Cartesian and polar curves, Volumes of solids of revolution.

Vector Algebra: Position vector of a point. Scalar and vector product of vectors. Scalar and vector product of three vectors. Geometrical interpretation of scalar and vector products. Physical application.

Math -103
Engineering Mathematics –II
No. of Credit : 3
3 Hrs per weak
Ordinary Differential Equation(D. E) :

1. Definitions and Terminology :
   Differential Equations as Mathematical Models related to Engineering problems.
2. Solution of 1st order and 1st degree D.E. by various method.
3. Solution of 1st order and higher order D.E

4. Trajectories
5. Solution of higher order D.E. with constant Co- efficient (Homogeneous & non homogeneous)
6. Solution of Euler's homogeneous linear equation
7. Solution of D.E. in series by the method of Frobenins.
8. Legendre functions and its properties.
9. Bessel's functions & its properties.
10. Application of ODE

Partial Differential equation(PDE):

1. Definitions and formation of PDE
2. Linear partial D.E.of 1st order
3. Non-Liner partial D.E. of 1st order
4. Linear partial D.E. with constant coefficients.
5. Partial D.E. of higher order with variable coefficients.

Two dimensional geometry :

1. Cartesian and polar co-ordinate systems.
2. Transformation of co-ordinates
3. Pair of Straight lines

General Equation of second degree: Standard form of the equation of parabola, Ellipse and Hyperbola in Cartesian and polar co-ordinates. Tangents and Normal. Director Circle, chord of contact pair of tangents, poles and polar.

Math-201
Engineering Mathematics-III
No. of Credit : 4
4 Hrs per week

Matrices : Review of matrix. Rank, inverse of matrix and elementary transformations, solution of a system of linear equations by matrix method, quadratic forms, matrix polynomials. Determination of characteristic roots and vectors, Cayley Hamitton thearem.

Matrix Application to solid mechanics and differential equation (Evaluating principal Stress, deflection of beam, and stability test of dynamic system).

Solid Geometry : System of co-ordinates, projection, direction cosines and direction ratios, Angle between two straight lines. Equation of planes, Angle between planes, distance from a point to a plane, Condition of perpendicularity and parallelism of planes, equation of straght lines. Shortest distance between given straight lines. Sphere, ellipsoid.

Vector calculus : Gradient, Divergence, Curl, Gauss's theorem, Green's theorem, Stoke's theorem, successive application there theorems , curvilinear co-ordinates. Application to kinematics, Hydrodynamics and Fluid dynamics.

Laplace's Transform : Introduction, Basic Theorems used in the solution of differential equations including problems in engineering mechanics.

Math-203
Engineering Mathematics- IV
No. of Credit : 4
4 Hrs per week
Statistics:
Introduction, Measure of Dispersion: Range, Mean deviation, variance, standard deviation and Coefficient of variance.
Curve fitting: Method of least square.
Probability: Definition, rules of combination, Baye's law.
Random variable: Discrete and continuous random variables, probability functions, Mathematical expectation.
Probability distribution: Discrete distributions like Binomial,
Negative Binomial, Geometric and Poisson distribution: Continuous distributions like Normal and Exponential distribution.
Spherical trigonometry : Spherical triangle polar triangle, properties of spherical triangle, relation between sides and angles of an spherical triangle properties of night angle triangle, solution of triangles .
Fourier Analysis: Fourier series, Fourier integral and Fourier transform
Harmonic Analysis: Introduction, Laplace's equation incartesion cylindrical and spherical co-ordinates, cylindrical harmonic, spherical harmonic, potential of a ring. potential about a spherical surface, general properties of harmonic functions.

5.6 COURSES OFFERED BY THE DEPARTMENT OF HUMANITIES

Hum-101
English
No. of credit: 3
3 hrs per week
Grammar
Functions of word classes, phrase structures and clause
Sentence making: basic sentence patterns, analysis, transformation and synthesis
Punctuation, word formation processes and common mistakes in English.
Reading
Various approaches to reading
Reading techniques and readability; Academic texts, types of texts, using reading lists, using library catalogues and using library websites to search electronic resources. Reading abstracts, fact and opinion, critical thinking.
Writing
Descriptive, narrative, argumentative and persuasive; Principles of paragraph writing, paragraph structure, development of ideas, and linking paragraph together.
Writing introduction and its structure, and opening sentences and conclusion.

Technical report writing and and its purposes and various forms, Methods of note taking, Notice writing, assignment and examination paper, Structure and cohesion, argument and discussion, cause and effect, comparison and contrast, definitions, exemplification, classification, generalizations, numbers, problems and solutions, and academic style.

Speaking

Speech delivery, announcement and dialogue, Group discussion and interview skills.

Hum-103
Engineering Economics
No. of Credit: 2
2 Hrs per week

Definition of Economics, Concept of microeconomics. Demand and supply Analysis, Market Equilibrium, Elasticity of demand & supply, Theory of utility and preference, Consumer behavior- Indifference curve analysis, analysis of consumer surplus and producer surplus. Consumer equilibrium. Theory of production, Theory of cost, concept of market and market structure.

Concept of macroeconomics, National Income analysis: Various concepts about GNP, NNP, GDP and NDP, methods of calculating national Income, Circular flow of income, Fundamentals of savings, Investment and consumption functions, Inflation, Unemployment: types of unemployment, problems of unemployment, how to solve the unemployment problem. Fiscal Policy and monetary policy: Characteristics of five-year plans and its implication in Bangladeshi Economy. Development Vs Growth, Development Problems related to Engineering, Technology as the master key for economic development. The pure theory of International trade.

Hum-201
Principle of Accounting & Costing
No. of Credit: 3
3 Hrs per week

Introductory: Definitions of book keeping, Costing and accounting, objects and advantages of book keeping; Principles of double entry book keeping, Accounting concepts and convention, Transaction, Definition of business transaction, Nature of business transactions, Journal, Ledger, Trail balance & Financial statement, Analysis of financial statement.

Depreciation: Definition, objects and types of depreciation, Methods of providing depreciation, classifying revenue and capital expenditure.

Cheque: Classification of cheque, Crossing of cheque and endorsement of cheque.

Cost Accounting: Introduction, Definition, objects and advantages of cost accounting, Elements of cost, Stores ledger, Overhead allocating.

Marginal analysis: Computation of Break Even point, Standard Costing, Cost Variance. Construction Costing, Budget and Budgetary Control.

Hum-203
State and Government
No. of credit: 2
2 Hours per week

Nature, Origin and Development of the State, Basic Concepts: Pressure Group, Interest Group, Civil Society, Good Governance, Political Party, Socialism, Fascism and Marxism. Nationalism and Internationalism, Organization Theories: Classical Theories- F.W. Taylor, Henry Fayol, Neo-classical theories and Modern Thories. Process of Organization- Motivation, Leadership, Communication, Decision-making, The United Nations, Bureaucracy, Forms of Government, Organs of Government, Local Government, Concepts of Public Administration: Power and Authority, Hierarchy, Division of work, Centralization and Decentralization, Structure and functions of Bangladesh Secretariat and attached departments, Constitutions.

Hum-205
Principles of Sociology
No. of Credit: 2
2 Hrs per week

Definition, Nature and Scope of Sociology, Sociological Perspectives, Importance of Studying Sociology for Civil Engineering Students, Method of Sociology, Basic Concepts: Society, Community, Association and Institution, Socialization, Nation and Nationality, Social Stratification, Group , Social Structure, Marriage and Family, Social change, Social control and Deviance, Culture and Civilization, Industrialization and Urbanization, Urban Ecology, Population and Environment: Population Growth, Environment as Sociological Issue, Sustainable Development, Environmental Decision making, Social Impacts of Disaster. Social Problems: Juvenile Delinquency, Crime. Unemployment, Corruption, Rights and Duties of Citizen in Society.